

Superconducting Magnet Division Business Plan

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NPP Retreat

70 YEARS OF
DISCOVERY

A CENTURY OF SERVICE



U.S. DEPARTMENT OF
ENERGY

BROOKHAVEN
NATIONAL LABORATORY

Outline:

- Business Model, (over)simplified
- Internal Strengths and Weaknesses
- External Opportunities and Threats
- Goals and How to Get There
- Key Concerns / Issues

Business Model:

- ~1/3 - Provide C-AD support as needed, tasks vary by FY:
 - AGS Cold Snake
 - E-Lens 6T superconducting solenoid
 - RHIC Helical magnet repairs
 - LeREC correctors (yes, we can make copper coils)
 - sPhenix
 - Valve box extension
 - Time Projection Chamber (TPC)
- ~ 2/3 - Survive by our wits:
 - DOE Programs / Projects
 - LHC (20 magnets + testing, \$40M)
 - APUL (2 magnets + testing, \$6M)
 - LARP (46 coils, 27 magnet tests, \$45M)
 - Work For Others (see next slide)

Internal Strengths

“3.6 SWOT Analysis

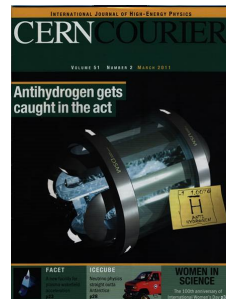
- Internal analysis revealed the **major strengths of SCMD to be experienced, imaginative staff, and extensive facilities...**

Greatest strength = staff:

- Extensive (> 30 yr) experience among scientists, engineers and technicians on all types of LTS and HTS superconducting magnet programs:

- SSC → High field NbTi cos θ magnets - 1st ever all-Kapton cable insulation!
- RHIC → R&D + Production:
 - Most cost effective superconducting magnet design ever
- LHC →
 - ZERO dipole, quad failures in 20 yr!
 - CQS @BNL: 432 magnets, 96 types, 1 magnet per day!
- DESY →
- BEPC-II → 1st use of new technology:
 - NbTi deposited directly on beam tube!
- Super KEK → Infinite variety, high field IR applications
- Alpha (2 so far) → High field 4m Nb₃Sn cos θ coils, magnet cold tests:
 - New 24kA, 1.9K test facility, state of the art energy extraction
- LARP →
- SMES, IBS → High field (25T) large bore HTS solenoids
 - State of the art quench detection
- iRCMS →
- NSLS-II ESM, LSST → Unique magnetic field measurement & power supply development

Antimatter trap cover story!



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Internal Weaknesses

“3.6 SWOT Analysis

- Internal analysis revealed the...**primary weaknesses to be age distribution of staff**, age of equipment, the size of staff (which is slightly too small), and overhead (which is largely to due space charges).

Greatest weakness = staff:

- **Aging**
- **At severely reduced numbers^{*}, “critical mass”; singular key personnel, most notably:**
 - **Electrical engineering & technical support**
 - **Cryogenic technical support**
- **Insufficient new hires → no succession plans**

*** Also causes increased OH rates, reducing our competitiveness**

External Opportunities and Threats

- External Opportunities – covered by P. Wanderer
- External Threats
 - Unfair competition by other National Laboratories
 - “U.S.” Magnet Development Program, coauthored by LBNL, FNAL and NHMFL, i.e., not BNL
 - LARP / AUP – BNL not fully utilized for magnet development, cold mass and magnet assembly, despite having “unfair competitive advantage” in some areas
 - Reduced DOE funding
 - Increasing OH rates (external to SMD)

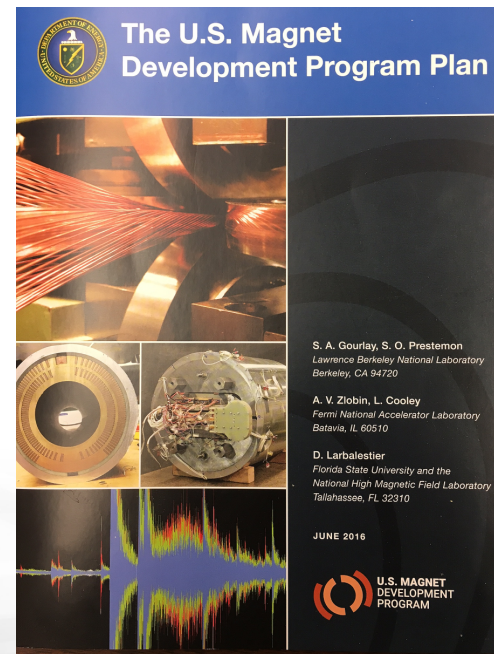


New and developing magnet projects:

- AUP aka LARP for LHC HiLumi upgrade
- Alpha-g (antihydrogen experiment at CERN)
- EIC IR magnets – many types
- Princeton Fusion lab PPPL - replace failed copper coils
- IBS Korea – high field solenoid magnet facility
- GARD – Magnet R&D for the future (e.g., FCC)
- SBIR/STTR
- Superconducting wiggler for NSLS II



Slide from P. Wanderer talk, this Retreat



Goals and How to Get There

1. Support the AUP LHC Hi-Lumi Project

- requires hiring a minimum of 5 technicians, likely more
- but not until FY19! Need a plan for other work in FY18 to build and train staff

2. Support eRHIC

- IR magnets are ALL UNIQUE AND CHALLENGING
- requires intensive engineering well in advance of CD1, because “Direct Wind” and Nb3Sn quads take very long to build
- needs eRHIC R&D funding, Program Development funding, C-AD Support, etc.;
- prevent becoming “victims of our own success”

3. Continue other R&D efforts

- maintain adequate staff in addition to above

Key Concerns / Issues

- Continued budget cuts will force reductions in staff making SMD no longer sustainable
- Staff will retire before new hires can be brought onboard and adequately trained

...infrastructure is aging also (IGPP funds are helping)